CATEGORY 7 - NAVIGATION AND AVIONICS

A. SYSTEMS, EQUIPMENT AND COMPONENTS

N.B.1: *For automatic pilots for underwater vehicles, see Category 8. For radar, see Category 6.*

7A001 Accelerometers as follows (see List of Items Controlled) and specially designed components therefor.

License Requirements

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to commodities that meet or exceed the parameters of 7A101.	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: See also 7A101 and 7A994. For angular or rotational accelerometers, see 7A001.b. MT controls do not apply to accelerometers that are specially designed and developed as Measurement While Drilling(MWD) sensors for use in downhole well service applications.
Related Definitions: N/A
Items:

a. Linear accelerometers having any of the following:

a.1. Specified to function at linear acceleration levels less than or equal to 15 g and having any of the following:

a.1.a. A "bias" "stability" of less (better) than 130 micro g with respect to a fixed calibration value over a period of one year; *or*

a.1.b. A "scale factor" "stability" of less (better) than 130 ppm with respect to a fixed calibration value over a period of one year;

a.2. Specified to function at linear acceleration levels exceeding 15 g but less than or equal to 100 g and having all of the following:

a.2.a. A "bias" "repeatability" of less (better) than 1,250 micro g over a period of one year; *and*

a.2.b. A "scale factor" "repeatability" of less (better) than 1,250 ppm over a period of one year; *or*

a.3. Designed for use in inertial navigation or guidance systems and specified to function at linear acceleration levels exceeding 100 g;

Note*: 7A001.a.1 and 7A001.a.2 do not apply to accelerometers limited to measurement of only vibration or shock.*

b. Angular or rotational accelerometers, specified to function at linear acceleration levels exceeding 100 g.

7A002 Gyros or angular rate sensors, having any of the following (see List of Items

Controlled) and specially designed components therefor.

License Requirements

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to commodities that meet or exceed the parameters of 7A102.	MT Column 1
AT applies to entire entry	AT Column 1

License Requirement Note: *For the purpose of MT controls only, the term 'stability' is defined as a measure of the ability of a specific mechanism or performance coefficient to remain invariant when continuously exposed to a fixed operating condition. (This definition does not refer to dynamic or servo stability.) (IEEE STD 528-2001 paragraph 2.247)*

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: See also 7A102 and 7A994. For angular or rotational accelerometers, see 7A001.b.
Related Definitions: N/A
Items:

a. Specified to function at linear acceleration levels less than or equal to 100 g and having any of the following:

a.1. A rate range of less than 500 degrees per second and having any of the following:

a.1.a. A "bias" "stability" of less (better) than 0.5 degree per hour, when measured in a 1 g environment over a period of one month, and with respect to a fixed calibration value; *or*

a.1.b. An "angle random walk" of less (better) than or equal to 0.0035 degree per square root hour; *or*

Note*: 7A002.a.1.b does not control 'spinning mass gyros'.*

Technical Note*: 'Spinning mass gyros' are gyros which use a continually rotating mass to sense angular motion.*

a.2. A rate range greater than or equal to 500 degrees per second and having any of the following:

a.2.a. A "bias" "stability" of less (better) than 40 degrees per hour, when measured in a 1 g environment over a period of three minutes, and with respect to a fixed calibration value; *or*

a.2.b. An "angle random walk" of less (better) than or equal to 0.2 degree per square root hour; *or*

Note*: 7A002.a.2.b does not apply to 'spinning mass gyros'.*

b. Specified to function at linear acceleration levels exceeding 100 g.

7A003 Inertial systems and specially designed components, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to commodities in 7A003.d that meet or exceed the parameters of 7A103	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: See also 7A103 and 7A994. Inertial Navigation Systems(INS) and inertial equipment, and specially designed components therefor specifically designed, modified or configured for military use are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. (See 22 CFR part 121.)
Related Definitions: "Data-Based Referenced Navigation" ("DBRN") systems are systems which use various sources of previously measured geo-mapping data integrated to provide accurate navigation information under dynamic conditions. Data sources include bathymetric maps, stellar maps, gravity maps, magnetic maps or 3-D digital terrain maps.
Items:

a. Inertial Navigation Systems (INS) (gimballed or strapdown) and inertial equipment, designed for "aircraft", land vehicles, vessels (surface or underwater) or "spacecraft", for navigation, attitude, guidance or control and having any of the following and specially designed components therefor:

a.1. Navigation error (free inertial) subsequent to normal alignment of 0.8 nautical mile per hour (nm/hr) "Circular Error Probable" ("CEP") or less (better); *or*

a.2. Specified to function at linear acceleration levels exceeding 10 g;

b. Hybrid Inertial Navigation Systems embedded with Global Navigation Satellite System(s) (GNSS) or with "Data-Based Referenced Navigation" ("DBRN") System(s) for navigation, attitude, guidance or control, subsequent to normal alignment and having an INS navigation position accuracy, after loss of GNSS or "DBRN" for a period of up to 4 minutes, of less (better) than 10 meters "Circular Error Probable" ("CEP");

c. Inertial measurement equipment for heading or True North determination and having any of the following, and specially designed components therefor:

c.1. Designed to have heading or True North determination accuracy equal to, or less (better) than 0.07 deg sec(Lat) (equivalent to 6 arc minutes (rms) at 45 degrees latitude); *or*

c.2. Designed to have a non-operating shock level of 900 g or greater at a duration of 1 msec, or greater;

d. Inertial measurement equipment including Inertial Measurement Units (IMU) and Inertial Reference Systems (IRS), incorporating accelerometers or gyros controlled by 7A001 or 7A002.

Note 1: *The parameters of 7A003.a and 7A003.b are applicable with any of the following environmental conditions:*

a. Input random vibration with an

overall magnitude of 7.7 g (rms) in the first 0.5 hour and a total test duration of 1.5 hour per axis in each of the 3 perpendicular axes, when the random vibration meets all of the following:

1. A constant Power Spectral Density(PSD) value of 0.04 g^2/Hz over a frequency interval of 15 to 1,000 Hz; and

2. The PSD attenuates with frequency from 0.04 g^2/Hz to 0.01 g^2/Hz over a frequency interval from 1,000 to 2,000 Hz;

b. An angular rate capability about one or more axes of equal to or more than +2.62 rad/s (150 deg/s); or

c. According to national standards equivalent to a. or b. of this note.

Note 2: *7A003 does not control inertial navigation systems which are certified for use on "civil aircraft" by civil authorities of a Wassenaar Arrangement Participating State, see Supplement No. 1 to Part 743 for a list of these countries.*

Note 3: *7A003.c.1 does not control theodolite systems incorporating inertial equipment specially designed for civil surveying purposes.*

Technical Note: *7A003.b refers to systems in which an INS and other independent navigation aids are built into a single unit (embedded) in order to achieve improved performance.*

7A004 'Star trackers' and components therefor, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: See also 7A104 and 7A994
Related Definitions: N/A
Items:

a. 'Star trackers' with a specified azimuth accuracy of equal to or less (better) than 20 seconds of arc throughout the specified lifetime of the equipment;

b. Components specially designed for equipment specified in 7A004.a as follows:

b.1. Optical heads or baffles;

b.2. Data processing units.

Technical Note: *'Star trackers' are also referred to as stellar attitude sensors or gyro-astro compasses.*

7A005 Global Navigation Satellite Systems (GNSS) receiving equipment having any of the following (see List of Items Controlled) and specially designed components therefor.

License Requirements

These items are subject to the export licensing

authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.

List of Items Controlled

Unit: N/A
Related Controls: See also 7A105 and 7A994. For equipment specially designed for military use, see Categories XI and XV of the U.S. Munitions List (22 CFR 121).
Related Definitions: N/A
Items:

a. Employing a decryption algorithm specially designed or modified for government use to access the ranging code for position and time; *or*

b. Employing 'adaptive antenna systems'.

Note: *7A005.b does not apply to GNSS receiving equipment that only uses components designed to filter, switch, or combine signals from multiple omni-directional antennae that do not implement adaptive antenna techniques.*

Technical Note: *For the purposes of 7A005.b 'adaptive antenna systems' dynamically generate one or more spatial nulls in an antenna array pattern by signal processing in the time domain or frequency domain.*

7A006 Airborne altimeters operating at frequencies other than 4.2 to 4.4 GHz inclusive and having any of the following (see List of Items Controlled).

License Requirements

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: See also 7A106, 7A994 and Category 6 for controls on radar.
Related Definitions: N/A
Items:

a. "Power management"; *or*

b. Using phase shift key modulation.

7A008 Underwater sonar navigation systems using Doppler velocity or correlation velocity logs integrated with a heading source and having a positioning accuracy of equal to or less (better) than 3% of distance traveled "Circular Error Probable" ("CEP") and specially designed components therefor.

License Requirements

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: 7A008 does not control systems specially designed for installation on surface vessels or systems requiring acoustic beacons or buoys to provide positioning data. See 6A001.a for acoustic systems, and 6A001.b for correlation-velocity and Doppler- velocity sonar log equipment. See 8A002 for other marine systems.
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

7A101 Accelerometers, other than those controlled by 7A001 (see List of Items Controlled), and specially designed components therefor.

License Requirements

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: This entry does not control accelerometers which are specially designed and developed as MWD (Measurement While Drilling) sensors for use in downhole well service operations.
Related Definitions: N/A
Items:

a. Linear accelerometers designed for use in inertial navigation systems or in guidance systems of all types, usable in "missiles" having *all* of the following characteristics, and specially designed components therefor:

a.1. 'Scale factor' "repeatability" less (better) than 1250 ppm; and

a.2. 'Bias' "repeatability" less (better) than 1250 micro g.

Note: *The measurement of 'bias' and 'scale factor' refers to one sigma standard deviation with respect to a fixed calibration over a period of one year.*

b. Accelerometers of any type, designed for use in inertial navigation systems or in guidance systems of all types, specified to function at acceleration levels greater than 100 g.

Note to paragraph (b): *This paragraph (b) does not include accelerometers that are designed to measure vibration or shock.*

7A102 Gyros, other than those controlled by 7A002 (see List of Items Controlled), and specially designed components therefor.

License Requirements

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: N/A
Related Definitions: 1.) Drift rate is defined as the time rate of output deviation from the desired output. It consists of random and systematic components and is expressed as an equivalent angular displacement per unit time with respect to inertial space. 2.) Stability is defined as standard deviation (1 sigma) of the variation of a particular parameter from its calibrated value measured under stable temperature conditions. This can be expressed as a function of time.
Items:

a. All types of gyros, usable in rockets, missiles, or unmanned aerial vehicles capable of achieving a "range" equal to or greater than 300 km, with a rated "drift rate" 'stability' of less than 0.5 degrees (1 sigma or rms) per hour in a 1 g environment.

b. Gyros of any type, designed for use in inertial navigation systems or in guidance systems of all types, specified to function at acceleration levels greater than 100 g.

Technical Note: *In this entry, the term 'stability' is defined as a measure of the ability of a specific mechanism or performance coefficient to remain invariant when continuously exposed to a fixed operating condition. (This definition does not refer to dynamic or servo stability.) (IEEE STD 528-2001 paragraph 2.247)*

7A103 Instrumentation, navigation equipment and systems, other than those controlled by 7A003, and specially designed components therefor.

License Requirements

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: 1) For rockets, missiles, or unmanned aerial vehicles controlled under the U.S. Munitions List (22 CFR part 121), items described in 7A103.b are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls (See 22 CFR part 121). (*2)* Inertial navigation systems and inertial equipment, and specially designed components therefor specifically designed, modified or configured for military use are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. (See 22 CFR part 121.)
Related Definitions: N/A
Items:

a. Inertial or other equipment using accelerometers or gyros controlled by 7A001, 7A002, 7A101 or 7A102 and systems incorporating such equipment;

Note 1: *7A103.a does not control equipment containing accelerometers specially designed*

and developed as MWD (Measurement While Drilling) sensors for use in down-hole well services operations.

***Note 2**: 7A103.a does not control inertial or other equipment using accelerometers or gyros controlled by 7A001 or 7A002 that are only NS controlled.*

b. Integrated flight instrument systems, which include gyrostabilizers or automatic pilots, designed or modified for use in rockets, missiles, or unmanned aerial vehicles capable of achieving a "range" equal to or greater than 300 km.

c. Integrated Navigation Systems, designed or modified for use in rockets, missiles, or unmanned aerial vehicles capable of achieving a "range" equal to or greater than 300 km and capable of providing a navigational accuracy of 200m Circular Error Probable (CEP) or less.

***Technical Note:** An 'integrated navigation system' typically incorporates the following components:*

1. An inertial measurement device (e.g., an attitude and heading reference system, inertial reference unit, or inertial navigation system);

2. One or more external sensors used to update the position and/or velocity, either periodically or continuously throughout the flight (e.g., satellite navigation receiver, radar altimeter, and/or Doppler radar); and

3. Integration hardware and software.

7A104 Gyro-astro compasses and other devices, other than those controlled by 7A004, which derive position or orientation by means of automatically tracking celestial bodies or satellites and specially designed components therefor.

License Requirements

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: This entry controls specially designed components for gyro-astro compasses and other devices controlled by 7A004.
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

7A105 Receiving equipment for Global Navigation Satellite Systems (GNSS) (e.g. GPS, GLONASS, or Galileo) having any of the following characteristics, and specially designed components therefor. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

1. Designed or modified for use in "missiles"; or

2. Designed or modified for airborne applications and having any of the following:

2.a. Capable of providing navigation

information at speeds in excess of 600 m/s (1,165 nautical mph);

2.b. Employing decryption, designed or modified for military or governmental services, to gain access to GNSS secured signal/data; or

2.c. Being specially designed to employ anti-jam features (e.g. null steering antenna or electronically steerable antenna) to function in an environment of active or passive countermeasures.

Note to 7A105: *See also 7A005 and 7A994*

7A106 Altimeters, other than those controlled by 7A006, of radar or laser radar type, designed or modified for use in "missiles". (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

7A107 Three axis magnetic heading sensors having *all* of the following characteristics, and specially designed components therefor.

License Requirements

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items:

a. Internal tilt compensation in pitch (+/-90 degrees) and roll (+/-180 degrees) axes;

b. Capable of providing azimuthal accuracy better (less) than 0.5 degrees rms at latitudes of +/- 80 degrees, referenced to local magnetic field; *and*

c. Designed or modified to be integrated with flight control and navigation systems.

Note: *Flight control and navigation systems in 7A107 include gyrostabilizers, automatic pilots and inertial navigation systems.*

7A115 Passive sensors for determining bearing to specific electromagnetic source (direction finding equipment) or terrain characteristics, designed or modified for use in "missiles". (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

7A116 Flight control systems (hydraulic, mechanical, electro-optical, or electro-mechanical flight control systems (including fly-by-wire systems) and attitude control equipment) designed or modified for "missiles". (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

7A117 "Guidance sets" capable of achieving system accuracy of 3.33% or less of the range (e.g., a "CEP" of 10 km or less at a range of 300 km). (These items are subject to the export licensing authority of the U.S.

Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

7A994 Other navigation direction finding equipment, airborne communication equipment, all aircraft inertial navigation systems not controlled under 7A003 or 7A103, and other avionic equipment, including parts and components, n.e.s.

License Requirements

Reason for Control: RS, AT

Control(s)	*Country Chart*
RS applies to QRS11-00100-100/101 and QRS11-00050-443/569 Micromachined Angular Rate Sensors. See Related Controls.	RS Column 1
AT applies to entire entry	AT Column 1

License Requirement Notes: *There is no de minimis level for foreign-made commercial primary or standby instrument systems that integrate QRS11-00100-100/101 or commercial automatic flight control systems that integrate QRS11-00050-443/569 Micromachined Angular Rate Sensors (see §734.4(a) of the EAR).*

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: QRS11 Micromachined Angular Rate Sensors are subject to the export licensing jurisdiction of the U.S. Department of State, Directorate of Defense Trade Controls, unless the QRS11-00100-100/101 is integrated into and included as an integral part of a commercial primary or standby instrument system of the type described in ECCN 7A994, or aircraft of the type described in ECCN 9A991 that incorporates such systems, or is exported solely for integration into such a system; or the QRS11-00050-443/569 is integrated into an automatic flight control system of the type described in ECCN 7A994, or aircraft of the type described in ECCN 9A991 that incorporates such systems, or are exported solely for integration into such a system. (See Commodity Jurisdiction requirements in 22 CFR Parts 121; Category VIII(e), Note(1)) In the latter case, such items are subject to the licensing jurisdiction of the Department of Commerce. Technology specific to the development and production of QRS11 sensors remains subject to the licensing jurisdiction of the Department of State.
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

7B001 Test, calibration or alignment equipment, specially designed for equipment controlled by 7A (except 7A994).

License Requirements

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1

AT applies to entire entry AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: (1) See also 7B101, 7B102 and 7B994. (2) This entry does not control test, calibration or alignment equipment for 'Maintenance level I' or 'Maintenance Level II'.
Related Definition: (1) 'Maintenance Level I': The failure of an inertial navigation unit is detected on the aircraft by indications from the Control and Display Unit (CDU) or by the status message from the corresponding sub-system. By following the manufacturer's manual, the cause of the failure may be localized at the level of the malfunctioning Line Replaceable Unit (LRU). The operator then removes the LRU and replaces it with a spare. (2) 'Maintenance Level II': The defective LRU is sent to the maintenance workshop (the manufacturer's or that of the operator responsible for level II maintenance). At the maintenance workshop, the malfunctioning LRU is tested by various appropriate means to verify and localize the defective Shop Replaceable Assembly (SRA) module responsible for the failure. This SRA is removed and replaced by an operative spare. The defective SRA (or possibly the complete LRU) is then shipped to the manufacturer. 'Maintenance Level II' does not include the disassembly or repair of controlled accelerometers or gyro sensors.
Items:

The list of items controlled is contained in the ECCN heading.

7B002 Equipment specially designed to characterize mirrors for ring "laser" gyros, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: See also 7B102 and 7B994
Related Definitions: N/A
Items:

a. Scatterometers having a measurement accuracy of 10 ppm or less (better);

b. Profilometers having a measurement accuracy of 0.5 nm (5 angstrom) or less (better).

7B003 Equipment specially designed for the "production" of equipment controlled by 7A (except 7A994).

License Requirements

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: 1.) See also 7B103, (this entry is subject to the licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls (see 22 CFR part 121)) and 7B994. 2.) This entry includes: Inertial Measurement Unit (IMU module) tester; IMU platform tester; IMU stable element handling fixture; IMU platform balance fixture; gyro tuning test station; gyro dynamic balance station; gyro run-in/motor test station; gyro evacuation and fill station; centrifuge fixtures for gyro bearings; accelerometer axis align stations; accelerometer test station; and fiber optic gyro coil winding machines.
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

7B101 "Production equipment", and other test, calibration, and alignment equipment, other than that described in 2B119 to 2B122, 7B003, and 7B102, designed or modified to be used with equipment controlled by 7A001 to 7A004 or 7A101 to 7A104.

License Requirements

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls:1.) See also 2B119 to 2B122, 7B003, 7B102, and 7B994. 2.) This entry includes: inertial measurement unit (IMU module) tester; IMU platform tester; IMU stable element handling fixture; IMU platform balance fixture; gyro tuning test station; gyro dynamic balance stations; gyro run-in/motor test stations; gyro evacuation and filling stations; centrifuge fixtures for gyro bearings; accelerometer axis align stations; and accelerometer test stations.
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

7B102 Equipment, other than those controlled by 7B002, designed or modified to characterize mirrors, for laser gyro equipment, as follows (see List of Items Controlled).

License Requirements

Reason for Control: MT, AT

Control(s)	*Country Chart*

MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items:

a. Scatterometers having a threshold accuracy of 10 ppm or less (better).

b. Reflectometers having a threshold accuracy of 50 ppm or less (better).

c. Prolifometers having a threshold accuracy of 0.5nm (5 angstrom) or less (better).

7B103 Specially designed "production facilities" for equipment controlled by 7A117. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

7B994 Other equipment for the test, inspection, or "production" of navigation and avionics equipment.

License Requirements

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

C. MATERIALS [RESERVED]

D. SOFTWARE

7D001 "Software" specially designed or modified for the "development" or "production" of equipment controlled by 7A (except 7A994) or 7B (except 7B994).

License Requirements

Reason for Control: NS, MT, RS, AT

Control(s)	*Country Chart*
NS applies to "software" for equipment controlled by 7A001 to 7A004, 7A006, 7A008, 7B001, 7B002 or 7B003	NS Column 1
MT applies to "software" for equipment controlled for MT reasons. MT does not apply to "software" for equipment controlled by 7A008.	MT Column 1

RS applies to "software" for inertial navigation systems inertial equipment, and specially designed components therefor, for "civil aircraft".	RS Column 1
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: $ value
Related Controls: 1.) See also 7D101 and 7D994. 2.) The "software" related to 7A003.b, 7A005, 7A103.b, 7A105, 7A106, 7A115, 7A116, 7A117, or 7B103 are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. (See 22 CFR part 121.) 3.) "Software" for inertial navigation systems and inertial equipment, and specially designed components therefor, not for use on civil aircraft are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. (See 22 CFR part 121.)
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

7D002 "Source code" for the operation or maintenance of any inertial navigation equipment, including inertial equipment not controlled by 7A003 or 7A004, or Attitude and Heading Reference Systems ('AHRS').

License Requirements

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: $ value
Related Controls: 1.) See also 7D102 and 7D994. 2.) This entry does not control "source code" for the operation or maintenance of gimballed 'AHRS'.
Related Definition: 'AHRS' generally differ from Inertial Navigation Systems (INS) in that an 'AHRS' provides attitude and heading information and normally does not provide the acceleration, velocity and position information associated with an INS.
Items:

The list of items controlled is contained in the ECCN heading.

7D003 Other "software" as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to "software" for equipment controlled for MT reasons. MT does not apply to "software" for equipment controlled by 7A008.	MT Column 1

AT applies to entire entry AT Column 1

License Exceptions

CIV: N/A
TSR: N/A
STA*:* License Exception STA may not be used to ship or transmit software in 7D003.a, b, or c to any of the eight destinations listed in § 740.20(c)(2) of the EAR.

List of Items Controlled

Unit: $ value
Related Controls: See also 0D521 No. 2 ("source code" for the "development" of fly-by-wire control systems), 0E521 No. 6 (for "technology" for the "development" of "software" controlled by 0D521 No. 2), 7D103 and 7D994.
Related Definitions: 'Data-Based Referenced Navigation' ('DBRN') systems are systems which use various sources of previously measured geo-mapping data integrated to provide accurate navigation information under dynamic conditions. Data sources include bathymetric maps, stellar maps, gravity maps, magnetic maps or 3-D digital terrain maps.
Items:

a. "Software" specially designed or modified to improve the operational performance or reduce the navigational error of systems to the levels controlled by 7A003, 7A004 or 7A008;

b. "Source code" for hybrid integrated systems which improves the operational performance or reduces the navigational error of systems to the level controlled by 7A003 or 7A008 by continuously combining heading data with any of the following:

b.1. Doppler radar or sonar velocity data;

b.2. Global Navigation Satellite Systems (GNSS) reference data; *or*

b.3. Data from 'Data-Based Referenced Navigation' ('DBRN") systems;

c. "Source code" for integrated avionics or mission systems which combine sensor data and employ "expert systems";

d. [RESERVED]

N.B. *For flight control "source code," see 7D004.*

e. Computer-Aided-Design (CAD) "software" specially designed for the "development" of "active flight control systems", helicopter multi-axis fly-by-wire or fly-by-light controllers or helicopter "circulation controlled anti-torque or circulation-controlled direction control systems", whose "technology" is controlled by 7E004.b, 7E004.c.1 or 7E004.c.2.

7D004 "Source code" incorporating "development" "technology" specified by 7E004.a or 7E004.b, for any of the following: (see List of Items Controlled).

License Requirements

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A
STA: License Exception STA may not be used to ship or transmit "software" in 7D004.a to .d and .g to any of the eight destinations listed in § 740.20(c)(2) of the EAR.

List of Items Controlled

Unit: $ value
Related Controls: See also 0D521 No. 2 ("source code" for the "development" of fly-by-wire control systems), 0E521 No. 6 (for "technology" for the "development" of "software" controlled by 0D521 No. 2), 7D103 and 7D994
Related Definitions: N/A
Items:

a. Digital flight management systems for "total control of flight";

b. Integrated propulsion and flight control systems;

c. Fly-by-wire or fly-by-light control systems;

d. Fault-tolerant or self-reconfiguring "active flight control systems";

e. [RESERVED];

f. Air data systems based on surface static data; *or*

g. Three dimensional displays.

***Note**: 7D004 does not apply to "source code" associated with common computer elements and utilities (e.g., input signal acquisition, output signal transmission, computer program and data loading, built-in test, task scheduling mechanisms) not providing a specific flight control system function.*

7D101 "Software" specially designed or modified for the "use" of equipment controlled by 7A001 to 7A006, 7A101 to 7A107, 7A115, 7A116, 7B001, 7B002, 7B003, 7B101, 7B102, or 7B103.

License Requirements

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: $ value
Related Controls: 1.) The "software" related to 7A003.b, 7A005, 7A103.b, 7A105, 7A106, 7A115, 7A116, 7A117, or 7B103 are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. (See 22 CFR part 121.) 2.) "Software" for inertial navigation systems and inertial equipment, and specially designed components therefor, not designed for use on civil aircraft by civil aviation authorities of a country listed in Country Group A:1 is subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. (See 22 CFR part 121.)
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

7D102 Integration "software", as follows (See List of Items Controlled).

License Requirements

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: $ value
Related Controls: The "software" related to 7A003.b or 7A103.b are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. (See 22 CFR part 121.)
Related Definitions: N/A
Items:

a. Integration "software" for the equipment controlled by 7A103.b.

b. Integration "software" specially designed for the equipment controlled by 7A003 or 7A103.a.

7D103 "Software" specially designed for modelling or simulation of the "guidance sets" controlled by 7A117 or for their design integration with "missiles". (This entry is subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

7D994 "Software", n.e.s., for the "development", "production", or "use" of navigation, airborne communication and other avionics.

License Requirements

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

E. TECHNOLOGY

7E001 "Technology" according to the General Technology Note for the "development" of equipment or "software", controlled by 7A (except 7A994), 7B (except 7B994), 7D001, 7D002, or 7D003.

License Requirements

Reason for Control: NS, MT, RS, AT

Control(s)	*Country Chart*
NS applies to "technology" for items controlled by 7A001 to 7A004, 7A006, 7A008, 7B001 to 7B003, 7D001 to 7D003	NS Column 1
MT applies to "technology" for equipment controlled for MT reasons. MT *does not* apply to "technology" for equipment	MT Column 1

controlled by 7A008. MT *does* apply to "technology" for equipment specified in 7A001, 7A002 or 7A003.d that meets or exceeds parameters of 7A101, 7A102 or 7A103.	
RS applies to "technology" for inertial navigation systems, inertial equipment and specially designed components therefor, for civil aircraft	RS Column 1
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A
STA: License Exception STA may not be used to ship or transmit any technology in this entry to any of the eight destinations listed in § 740.20(c)(2) of the EAR.

List of Items Controlled

Unit: N/A
Related Controls: 1.) See also 0D521 No. 2 ("source code" for the "development" of fly-by-wire control systems), 0E521 No. 6 (for "technology" for the "development" of "software" controlled by 0D521 No. 2), 7E101 and 7E994. 2.) The "technology" related to 7A003.b, 7A005, 7A103.b, 7A105, 7A106, 7A115, 7A116, 7A117, 7B103, software in 7D101 specified in the Related Controls paragraph of ECCN 7D101, 7D102.a, or 7D103 are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls (see 22 CFR part 121).
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

7E002 "Technology" according to the General Technology Note for the "production" of equipment controlled by 7A (except 7A994) or 7B (except 7B994).

License Requirements

Reason for Control: NS, MT, RS, AT

Control(s)	*Country Chart*
NS applies to "technology" for equipment controlled by 7A001 to 7A004, 7A006, 7A008 or 7B001 to 7B003	NS Column 1
MT applies to "technology" for equipment controlled for MT reasons. MT *does not* apply to "technology" for equipment controlled by 7A008. MT *does* apply to "technology" for equipment specified in 7A001, 7A002 or 7A003.d that meets or exceeds parameters of 7A101, 7A102 or 7A103.	MT Column 1
RS applies to "technology" for inertial navigation systems, inertial equipment and specially designed components therefor, for civil aircraft	RS Column 1
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A
STA: License Exception STA may not be used to ship or transmit any technology in this entry to any of the eight destinations

listed in § 740.20(c)(2) of the EAR.

List of Items Controlled

Unit: N/A
Related Controls: 1.) See also 7E102 and 7E994. 2.) The "technology" related to 7A003.b, 7A005, 7A103.b, 7A105, 7A106, 7A115, 7A116, 7A117, or 7B103 are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls (see 22 CFR part 121).
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

7E003 "Technology" according to the General Technology Note for the repair, refurbishing or overhaul of equipment controlled by 7A001 to 7A004.

License Requirements

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: N/A
Related Controls: See also 7E994. This entry does not control maintenance "technology" directly associated with calibration, removal or replacement of damaged or unserviceable LRUs and SRAs of a "civil aircraft" as described in 'Maintenance Level I' or 'Maintenance Level II'.
Related Definition: Refer to the Related Definitions for 7B001 for 'Maintenance Level I' or 'Maintenance Level II'.
Items:

The list of items controlled is contained in the ECCN heading.

7E004 Other "technology" as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to "technology" for equipment or systems controlled for MT reasons.	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A
STA: (1) Paragraph (c)(1) of License Exception STA (§ 740.20(c)(1) of the EAR) may not be used for 7E004, except for 7E004.a.7. (2) Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for 7E004, except for 7E004.a.7.

List of Items Controlled

Unit: N/A
Related Controls: (1) See 0D521 No. 2

("source code" for the "development" of fly-by-wire control systems), 0E521 No. 6 (for "technology" for the "development" of "software" controlled by 0D521 No. 2). (2) See also 7E001, 7E002, 7E101, and 7E994. (3) In addition to the Related Controls in 7E001, 7E002, and 7E101 that include MT controls, also see the MT controls in 7E104 for design "technology" for the integration of the flight control, guidance, and propulsion data into a flight management system, designed or modified for rockets or missiles capable of achieving a "range" equal to or greater than 300 km, for optimization of rocket system trajectory; and also see 9E101 for design "technology" for integration of air vehicle fuselage, propulsion system and lifting control surfaces, designed or modified for unmanned aerial vehicles capable of achieving a "range" equal to or greater than 300 km, to optimize aerodynamic performance throughout the flight regime of an unmanned aerial vehicle.

Related Definitions: "*Primary flight control*" means an "aircraft" stability or maneuvering control using force/moment generators, i.e., aerodynamic control surfaces or propulsive thrust vectoring.

Items:

a. "Technology" for the "development" or "production" of any of the following:

a.1. [RESERVED]

a.2. Air data systems based on surface static data only, i.e., which dispense with conventional air data probes;

a.3. Three dimensional displays for "aircraft";

a.4. [RESERVED]

a.5. Electric actuators (i.e., electromechanical, electrohydrostatic and integrated actuator package) specially designed for "primary flight control";

a.6. "Flight control optical sensor array" specially designed for implementing "active flight control systems"; or

a.7. "DBRN" systems designed to navigate underwater, using sonar or gravity databases, that provide a positioning accuracy equal to or less (better) than 0.4 nautical miles;

b. "Development" "technology", as follows, for "active flight control systems" (including fly-by-wire or fly-by-light):

b.1. Photonic-based "technology" for sensing aircraft or flight control component state, transferring flight control data, or commanding actuator movement, "required" for fly-by-light "active flight control systems";

b.2. [RESERVED]

b.3. Real-time algorithms to analyze component sensor information to predict and preemptively mitigate impending degradation and failures of components within an "active flight control system";

***Note**: 7E004.b.3 does not include algorithms for purpose of off-line maintenance.*

b.4. Real-time algorithms to identify component failures and reconfigure force and moment controls to mitigate "active flight control system" degradations and failures;

***Note**: 7E004.b.4 does not include algorithms for the elimination of fault effects through comparison of redundant data sources, or off-line pre-planned responses to anticipated failures.*

b.5. Integration of digital flight control, navigation and propulsion control data, into a

digital flight management system for "total control of flight";

***Note**: 7E004.b.5 does not apply to:*

1. "Development" "technology" for integration of digital flight control, navigation and propulsion control data, into a digital flight management system for "flight path optimization";

2. "Development" "technology" for "aircraft" flight instrument systems integrated solely for VOR, DME, ILS or MLS navigation or approaches.

b.6. Full authority digital flight control or multisensor mission management systems, employing "expert systems";

***N.B.:** For "technology" for "Full Authority Digital Engine Control Systems" ("FADEC Systems"), see ECCN 9E003.h.*

***Note**: 7E004.b does not apply to "technology" associated with common computer elements and utilities, e.g., input signal acquisition, output signal transmission, computer program and data loading, built-in test, task scheduling mechanisms) not providing a specific flight control system function.*

c. "Technology" for the "development" of helicopter systems, as follows:

c.1. Multi-axis fly-by-wire or fly-by-light controllers, which combine the functions of at least two of the following into one controlling element:

c.1.a. Collective controls;

c.1.b. Cyclic controls;

c.1.c. Yaw controls;

c.2. "Circulation-controlled anti-torque or circulation-controlled directional control systems";

c.3. Rotor blades incorporating "variable geometry airfoils", for use in systems using individual blade control.

7E101 "Technology", according to the General Technology Note for the "use" of equipment controlled by 7A001 to 7A006, 7A101 to 7A107, 7A115 to 7A117, 7B001, 7B002, 7B003, 7B101, 7B102, 7B103, or 7D101 to 7D103.

License Requirements

Reason for Control: MT, RS, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
RS applies to "use" of inertial navigation systems, inertial equipment and specially designed components therefor, for civil aircraft.	RS Column 1
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: N/A
Related Controls: The "technology" related to 7A003.b, 7A005, 7A103.b, 7A105, 7A106, 7A115, 7A116, 7A117, 7B103, software specified in the Related Controls paragraph of ECCN 7D101, 7D102.a, or 7D103 are subject to the export licensing authority of the U.S. Department of State,

Directorate of Defense Trade Controls. (See 22 CFR part 121.)
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

7E102 "Technology" for protection of avionics and electrical subsystems against electromagnetic pulse (EMP) and electromagnetic interference (EMI) hazards, from external sources, as follows (see List of Items Controlled).

License Requirements

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items:

a. Design "technology" for shielding systems;

b. Design "technology" for the configuration of hardened electrical circuits and subsystems;

c. Design "technology" for the determination of hardening criteria of .a and .b of this entry.

7E104 Design "Technology" for the integration of the flight control, guidance, and propulsion data into a flight management system, designed or modified for "missiles", for optimization of rocket system trajectory. (This entry is subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

7E994 "Technology", n.e.s., for the "development", "production", or "use" of navigation, airborne communication, and other avionics equipment.

License Requirements

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: N/A
Related Controls: Technology specific to the development and production of QRS11 sensors remains subject to the licensing jurisdiction of the Department of State (see ECCN 7A994, Related Controls).
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

EAR99 Items subject to the EAR that are *not* elsewhere specified in this CCL Category *or*

in any other category in the CCL are designated by the number *EAR99*.